

MCCLELLAN AFB DIGITAL WIND MEASURING SYSTEM



7/07/2006

\$8.5 MILLION CONTRACT TO DEVELOP SYSTEM TO BE USED BY MILITARY BASE WEATHER STATIONS WORLDWIDE TO CONTINUOUSLY MEASURE, DISPLAY AND RECORD WIND PARAMETERS

The Sutron Corporation was awarded a contract to develop and produce a digital wind measuring system. This system consists of a wind speed and direction sensor, indicator assembly, and recorder assembly. It is used in military base weather stations worldwide to continuously measure, display, and record the following parameters:

- Horizontal wind speed
- Wind direction
- Peak gusts
- Gust spread (maximum difference between a 5-second wind speed peak and a 5-second wind speed lull)
- Peak wind over the most recent 10-minute, 60-minute, and 24-hour periods
- Direction variability (the two extreme wind directions in the most recent 10 minutes); and
- Standard deviation of wind direction in the most recent 10 minutes.

The field sensor assembly is located along or at the end of an airport runway. The sensor's internal microprocessor constantly measures the critical parameters which affect wind speed measurement and corrects for these factors to ensure that wind speed accuracy requirements are met. The wind sensor is capable of measuring wind speeds of 0-150 knots and 0° - 360°. It will operate to the following accuracy's:

- Speed: 0-50 knots: ± 1 knot; knots: $\pm 5\%$. knots: $\pm 10\%$; and
- Direction: 0°-360° $\pm 3^\circ$

The processor calculates a new 2-minute wind speed and wind direction average from stored Cartesian 5-second averages at the end of each 5-second collection cycle.

Every 5 seconds, the processor selects the highest of the 5-second wind speeds from the last 120 samples. The following decision procedure is used to determine wind gusts. If a value is both at least 5 knots greater than the current 2-minute average, and at least 10 knots greater than a 5-second average which occurred within one minute of the maximum, the processor will identify it as the peak gust. Otherwise, the processor will select the next highest value and repeat the decision procedure until all possible gusts are evaluated. The peak gust's speed in knots, or zeroes

if there is no gust, will be transmitted to other assemblies. The following procedure will be used to determine the gust spread of the most recent 120 five-second polar speed averages. An average is compared with all other



OWNER: U. S. Air Force Logistics Command, McClellan Air Force Base

PROJECT: Develop & produce a digital wind measuring system that consists of a wind speed and direction sensor, indicator assembly, and recorder assembly. It is used in military base weather stations worldwide.

DATE: 1985 to present

averages that are both within one minute of it, and no more than 10 minutes old. The maximum difference is saved. This is repeated for all 120 averages. The highest difference is the gust spread. This procedure will be performed every 5 seconds.

In addition, every 5 seconds the 10-minute and hourly peak wind speeds, directions, and times will be updated. This will be accomplished by searching the stored 5-second averages for maxima.

To determine direction variability, the processor will assemble the last 120 five-second polar direction averages in ascending order. The assembled list will be processed to determine the gap (in degrees) between ascending direction averages. Compensation will be made for crossing the zero degree pole. The negative space of the largest gap is the direction variability.

SUTRON